

# Hybrid Axial and Cross-Flow Fan Propulsion for Transonic Blended Wing Body Aircraft, Phase I

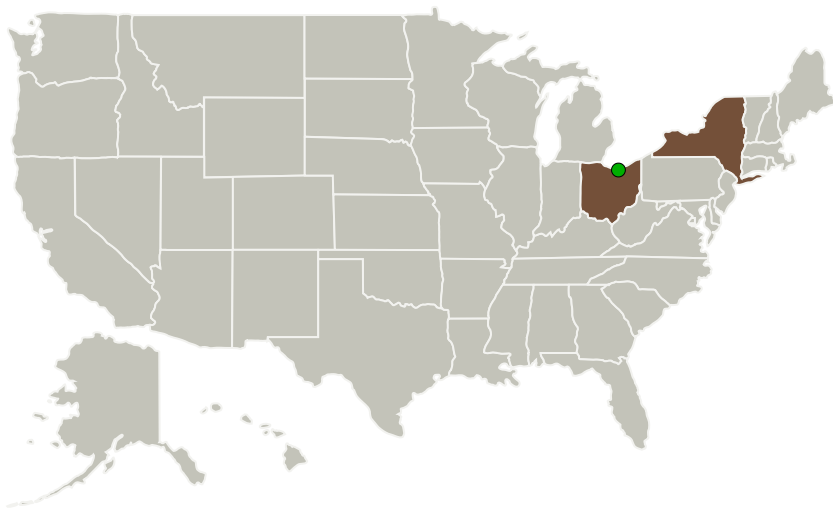
Completed Technology Project (2011 - 2011)



## Project Introduction

The challenges of the next century of aviation will require innovative and revolutionary concepts to meet air transportation demands. One NASA vision for future transport-sized aircraft includes the blended-wing-body (BWB) platform with embedded, distributed propulsion as a means for increased efficiency and reduced noise. In cruise, embedded propulsion benefits from boundary layer ingestion and wake filling, resulting in high propulsive efficiency. However, several challenges exist, including inlet nozzle design, propulsor design for ingestion of highly non-uniform inflow, and propulsor/airframe support structure optimization. This work proposes a hybrid turboelectric propulsion system incorporating small embedded, distributed cross-flow fans (CFF) for boundary layer control and wake filling, and much larger axial fans for primary thrust. Bringing together the best qualities of both axial and CFF propulsion, a substantial improvement in overall vehicle efficiency is possible. CFD and analytical analyses will be used to investigate the flow field and range of application for such a system. Comparisons will be made with published baseline designs with respect to power requirements, component weights, support structure, and other key parameters.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Propulsive Wing, LLC	Lead Organization	Industry	Elbridge, New York
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
New York	Ohio

## Project Transitions

**February 2011:** Project Start

**September 2011:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138605>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Propulsive Wing, LLC

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

Carlos Torrez

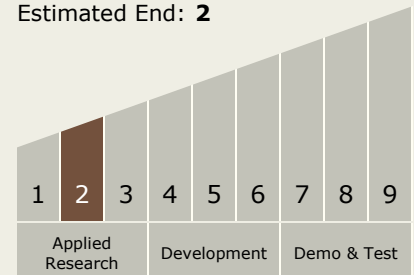
## Principal Investigator:

Joseph Kummer

## Technology Maturity (TRL)

Current: **2**

Estimated End: **2**



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## Technology Areas

### Primary:

- TX01 Propulsion Systems
  - └ TX01.3 Aero Propulsion
    - └ TX01.3.10 Turboelectric Propulsion

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System